

***Секция «Модели и методы управления организационными,
социально-экономическими системами»***

MANAGEMENT OF AUTOMOTIVE ENGINE UPGRADES

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Automotive Engines Upgrades is a process where an automotive engines were being remanufactured using performance oriented aftermarket parts available on the market [1], [2]. The modern car tuning trend started from Japanese automakers where owners started upgrading their car engines using aftermarket parts to increase the engine performance. In the 90's Japanese automakers decided to limit the engine power they produce to 276hp to avoid horsepower war between Japanese automakers but they designed their engine to handle more than 300hp with aftermarket parts as their business model and to support the Japanese aftermarket parts industry.

The best automobile at the moment designed to be highly customizable is the 2024 Toyota GR86 / Subaru BRZ since Toyota and Subaru Motors Corp decide to build an affordable sports car for the global market with large aftermarket support. The aftermarket parts we were going to use on this engine modification is HKS Co. Ltd Japan.

The categories by type of engine modification are as follows.

1. Exhaust Muffler and Performance Air Filter Upgrade. The factory muffler and air filter will be replace with lighter stainless steel exhaust pipes. It improves exhaust gasflow while performance air filter increases the incoming airflow while the vehicle is moving going to the engine. This modification can range from under \$100 for basic parts to over \$1000 for full systems.

2. Oil Cooler Upgrades. When engine oil is becoming too hot when the engine is running to its full potential it becomes too thin to lubricate and the engine may seize. Oil Cooler is a small heat exchanger installed on the vehicle to make the engine oil pass through this part to cool it down. Oil cooler upgrade costs vary from around \$50 for basic universal units to more than \$1,000 for specialized kits, with typical performance upgrades in the \$300 to \$600+ range, plus potentially high labor for installation, especially in complex diesel engines

3. Bolt On Turbo Kit Upgrades. Installing a Turbocharger kit will increase its engine horsepower significantly that acts like an air compressor. Factory Subaru FA24 came as Natural Aspirated. Costs for such update generally range from \$1,000 to over \$6,000 for the kit itself plus \$500 - \$1,500 for professional installation.

4. ECU Remapping / ECU Tuning. It is a process where you custom calibrate the air fuel mixture pre-program on the factory ECU (Engine Control Unit) using a aftermarket apparatus Increase Engine Bore and Stroke Upgrade. The cost for this upgrade can be \$50 - \$200 for basic online/software tunes or \$500 - \$2,000 for professional dyno tuning or complex upgrades.

Such upgrade processes are irreversible since the engine block will undergo a machining process to increase its displacement. The engine 2.4L displacement to 2.5L engine using the HKS engine upgrade kit.

If the process is done in a single package it is considered to be an engine remanufacturing process [3].

The negative effect of having an engine upgrade like a near racing engine is that it needs regular tune up and service since the engine must be on top performance.

In Figure 1 there is the software used by Speedlab Philippines called ROM Maker – one of the pioneer of ECU Tuning[4] shop in the Philippines. Each corresponding number seen on the chart represent how much air and fuel mixture is being done on every engine rpm in order to get the maximum horsepower and fuel efficient the engine can perform.

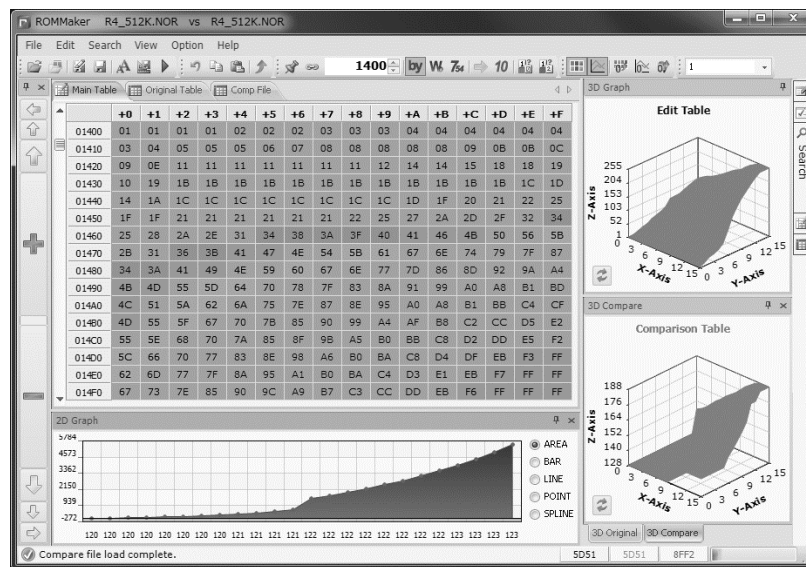


Figure 1 – ROM Maker software

So far this industry trend is growing significantly especially on emerging economy like the Philippines and Thailand that start manufacturing its own aftermarket parts or Japanese companies like HKS Japan and Denso Corp open its first factory in Thailand to manufacture aftermarket.

Overall, in business and management perspective it's a very prospective business because it's already considered the next level of automotive service business model and venturing into engine remanufacturing business model and creating a sustainable industry and the environment.

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ANALYSIS OF MODERN TECHNOLOGIES FOR MONITORING CROP FARMS

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As the world population rises, so does the global food demand. This makes it necessary to have an efficient method of monitoring crop health to improve efficiency, crop yields and resource management as agriculture is the main source of food. This is addressed by modern technologies such as drones, satellites and a new CubeSat design, which will be discussed in this article.

Firstly, drones in agriculture are unmanned aerial vehicles (UAVs) which are equipped with multispectral and thermal cameras that captures photos of crop plantations. They capture very high-resolution images that allow real-time and very accurate monitoring of the health of crops. With the aid of drones, farmers can detect pests and diseases, and also identify plantation portions that require attention.

The main advantages of drones are that they are cheaper compared to other types of technologies for monitoring crop farms like satellites. They can cover medium to large areas quickly. However, their operation range is limited to small areas, compared to satellites. For large scale plantations, a fleet of drones would be required which would make it more expensive.

Another technology used for monitoring crop farms is the use of satellites through remote sensing. Remote sensing refers to using satellites to collect information about Earth's surface without direct contact. Satellites equipped with optical instruments such as multispectral cameras and sensors are used for large scale or regional monitoring of farms. Some satellites such as Sentinel 2 have open-source data which can be used to monitor plantations and vegetation cover of any region in the world. The Sentinel 2 satellite visits the same region once every 4 to 5 days.

The main practical applications of using these technologies are: